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VARIANCE AND DISSENT

Reply

Clinimetrics and psychometrics: two sides of the same coin

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In this issue of the *Journal of Clinical Epidemiology*, Streiner advocates the abolishment of clinimetrics [1]. We have a number of arguments to keep clinimetrics alive and even to promote its use. The merit of Feinstein's introduction of the term "Clinimetrics" and the appearance of his book on "Clinimetrics" [2] is the increased attention for measurement issues within medicine. We believe that this would never have occurred with the introduction of psychometry in medicine, which clinicians would easily disqualify as being none of their business. Apart from the need to use terms attractive to clinicians, the approaches used should fit in the frame of thinking of doctors; for example, to assess interobserver variation clinicians prefer the Bland and Altman method [3], which expresses the measurement error in the dimension of measurement, while psychologists would prefer an intraclass correlation coefficient (ICC), a number between 0 and 1 [4]. Such a coefficient is less attractive to clinicians because it does not give them a clue about the size of the measurement error. By the same token, indexes based on clinical judgement fit more in the mode of thinking of clinicians than the construction of scales using sophisticated statistical methods [2].

There obviously exists a substantial overlap between clinimetrics, psychometrics, and biometrics. Were these terms to be defined anew, we would propose the term "metrics" as an indication of a measurement discipline and label it as biometrics, psychometrics, or clinimetrics, depending on the field of application. Feinstein [2] and Fayers and Hand [5] propose to reserve psychometrics for unidimensional scales and clinimetrics for multidimensional indexes. We agree with Fayers and Hand that the clinimetric and the psychometric approach are not contradictory, but serve different aims: the clinimetric approach is directed at the development of instruments to measure multiple constructs with a single index (e.g., the Apgar score or the TNM score to assess tumors, nodes and metastases in cancer patients), while the psychometric approach is appropriate to develop instruments that measure a single construct using multiple items (e.g., depression or anxiety) [5]. Fayers and Hand elegantly explain this appropriateness for different purposes by distinguishing two different types of variables to be included in measurement instruments: indicator variables and causal variables. Indicator variables are variables that correlate with the underlying construct to be measured, but do not alter or influence this construct. Causal variables influence the construct to be measured by a causal relationship, for example, being symptoms of the disease or side effects of the treatment. In general, psychometric measurement instruments only include indicator variables that are always correlated with the construct under study, while clinimetric instruments may also include causal variables. The difference between the clinimetric and the psychometric approach is most evident in the development phase of the instrument. In psychology, unidimensional constructs (such as intelligence, personality, or internal locus of control) are often assessed, and for this purpose psychometric methods are needed. Factor analysis, to examine the underlying dimensions of the scale, and assessments of the internal consistency of the scale or subscales are important psychometric properties. In medicine, composite indexes combining different symptoms and characteristics are more often at issue, and for this purpose clinimetric methods are appropriate. These clinimetric and psychometric approaches typically meet in the construction of measurements to measure quality of life, for which both clinical and psychological phenomena are important, and both indicator and causal variables may be included in parts of the instrument. In the evaluation of measurement instruments, when assessing validity, reproducibility, or responsiveness, the differences between clinimetric and psychometric approaches are less obvious and the characteristics can be considered as clinimetric or psychometric, depending on the measurement of clinical or psychologic phenomenon.

With Feinstein [2], others see differences between clinimetrics and psychometrics in the way the instruments are developed (more content driven in case of clinimetrics, more statistically driven in case of psychometrics) [5–7]. Comparison of both approaches showed that different items would be

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included in an instrument depending on the method used [6,7]. This indicates that the approaches are different.

As Streiner [1] correctly points out, none of these distinctions, either based on fields of application, number of dimensions, or the principle of item selection are exclusive. It is a matter of degrees: for clinical purposes, the instruments are more often multidimensional and typically constructed on the basis what patients or clinicians consider to be important. This indeed hampers a clear distinction between the terms psychometrics and clinimetrics. Both metric disciplines make use of the same methodologic and statistical approaches, depending on the goal and the subject of measurement. The remark of Streiner [1] that clinimetrists are ignoring the literature on psychometrics can easily be refuted by various examples. Disability, a clinical phenomenon, has been examined by techniques from the item response theory [8,9], and the generalizability theory has been applied to range of motion measurements [10].

Most clinimetrists, including Feinstein, are very much aware of the merits of psychometrics for the development of clinimetrics. In fact, the book of Streiner and Norman on Health Measurement Scales, which is written from a psychometric perspective, is widely used in clinical and health research as well as education. It has greatly helped to prevent clinimetrists from being ignorant.

We strongly believe that clinimetrics is here to stay. The term is instrumental in involving medical doctors in metrics. Furthermore, its vocabulary rightly stresses the aspects of metrics, which are most important for measurement in clinical research and practice.

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